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Haz. Waste Listing
of Dipine

Part III

**Environmental
Protection Agency**

Hazardous Waste Management System;
Proposed Rule

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

002993

(a) The production and manufacturing use⁸ of tri-, tetra-, or pentachlorophenol and intermediates used to produce their derivatives;⁹

(b) The manufacturing use of tetra-, penta-, or hexachlorobenzenes under alkaline conditions;

(c) the production of materials on equipment previously used for the production or manufacturing use of materials listed under (a) and (b) above; and

(d) discarded unused formulations containing tri-, tetra-, or pentachlorophenols, or discarded unused formulations containing compounds derived from these chlorophenols.⁶

⁸In the context of this listing, "manufacturing use" means the use of the named chemical as a reactant or chemical intermediate (for instance, as in the use of 2,4,5-trichlorophenol (2,4,5-TCP) as a feedstock for the synthesis of 2,4,5-T), or as a component in a formulating process (as, for instance, in the formulation of a mixture of 2,4,5-TCP and 1,2,4,5-TeCP, in which these components retain their chemical identity). In the present context, the term "manufacturing use" does not include residues from the use of chlorophenoxy pesticide formulations, e.g., in wood preservation.

⁹The principal manufacturing use of chlorophenols is in the synthesis of chlorophenoxy acids, esters, and amines. They are also used in the synthesis of phenolic resins, and of dye and pigment intermediates. However, only wastes from chlorophenoxy synthesis are listed as hazardous wastes, because the Agency has no data on the conditions of synthesis, generation of wastes, and the level of chlorinated dibenzo-p-dioxin or -dibenzofuran contamination of wastes from the synthesis of phenolic resins, dyes, and pigments. The Agency solicits data on the extent of CDD/CDF contamination of the latter wastes. We also are presently initiating sampling of some of these wastes in the course of our ongoing Industry Studies program.

¹The 2,4,5-TCP derivative Hexachlorophene is now synthesized from a purified 2,4,5-TCP in an acid-catalyzed condensation reaction. Because the reaction occurs at rather low temperatures, and at acid pH, no CDD or CDF formation is expected to occur. Earlier production techniques resulted in TCDD contamination. Wastes resulting from Hexachlorophene production therefore are not included in this listing unless prepurified 2,4,5-TCP was not used, or the process took place on equipment contaminated with CDDs or CDFs.

²This category of listed wastes includes discarded pesticides and formulations containing tri-, tetra-, or pentachlorophenol as ingredients. Some of these materials, namely EPA Hazardous Wastes U212, Z30, Z31, Z42, and the chlorophenoxy pesticides U232 and U233 already are hazardous wastes under 40 CFR 261.33(f) when discarded in commercial grade, technical grade, or off-specification form, or when present as the sole active ingredient in a formulation. However, discarded formulations containing these chlorophenols or chlorophenoxy compounds as one of a number of ingredients (for example, in a mixture of 2,4,5-T and 2,4-D) are not presently considered to be hazardous wastes (unless they exhibit a characteristic of hazardous waste). These multi-ingredient formulations nevertheless are likely to be just as toxic as sole active ingredient mixtures, since the concentration of toxic ingredients is the same or higher. Today's action thus would remedy this gap in regulatory coverage by listing the multi-ingredient formulations containing the discarded

III. Basis for Listing

A. Toxicity of contaminants of concern

1. *Toxicity of chlorinated dioxins and -dibenzofurans.* The contaminants of concern in these wastes are CDDs and CDFs, tri-, tetra-, and pentachlorophenols, and the chlorophenoxy derivatives of these chlorophenols. CDDs and CDFs are, for certain animal species, among the most potent toxic substances known.¹⁰ TCDD and two HxCDD isomers are among the most potent animal carcinogens tested. Since each of these substances are carcinogenic in well-conducted tests in both rats and mice, they are also considered by the Agency to be potential human carcinogens [see 44 FR 39858-39879 (July 6, 1979)]. In laboratory studies, TCDD has also been shown to be teratogenic, fetotoxic, and embryotoxic at extremely low doses (ng/kg/day). Based on structure-activity relationships, TCDF also may have reproductive effects at extremely low doses. Many CDDs and CDFs are acute toxicants as tested in laboratory animals at the µg/kg/day dose rate, and, even at these very low concentrations, have many observable physiologic effects. Although an EPA Scientific Advisory Panel determined 1 ng/kg body weight to be "for all practical purposes" a no observed effect level in rodents (44 FR 72337 (December 13, 1979)), several other scientists have concluded that a NOEL has not been conclusively demonstrated. Moreover, the Scientific Advisory Panel concluded that a NOEL had not been demonstrated for primates. In addition, the U.S. Food and Drug Administration has established a guideline suggesting limitation of human consumption of fish containing TCDD concentrations greater than 25-50 ng/kg (ppt). Furthermore, in several enforcement actions and in two site-specific risk assessments conducted by the Agency regarding Times Beach and Imperial in Missouri, environmental concentrations in the ppt to ppb range were determined to be levels of concern, and were used to define clean-up levels.

The Agency emphasizes that, for purposes of this regulation, it considers all CDDs and CDFs as toxicants of concern in these wastes. Many biochemical and toxicology studies have

listed compounds. In addition, we are amending the basis for listing these commercial chemical products to include certain chlorinated dioxins and -dibenzofurans as toxicants of concern.

¹⁰The statements on toxicity, persistence, and environmental contamination outlined in this preamble are more fully explained and substantiated in the background document for this listing which is available for review in the public docket.

demonstrated that there are well-defined structure/activity correlations defining the acute and chronic toxic effects of PCDDs and PCDFs. Those isomers that have halogens in at least three of the four lateral ring positions (numbers 2,3,7, or 8), and that have at least one ring hydrogen atom, are the most toxic isomers. All the CDDs and CDFs substituted in this manner have extremely high acute toxicity, bind strongly to a cytosolic protein receptor, and are potent inducers of several liver enzymes. The Agency recognizes that, even within such congeneric groupings, there are differences in toxicity. There is, for instance, a 370-fold difference in acute toxicity between the 1,2,3,7,8- and the 1,2,4,7,8-PeCDD isomers; however, even the less toxic isomer has extremely high acute toxicity (oral LD₅₀ in the guinea pig = 1.1 mg/kg).

Only limited toxicity information is available on certain of the CDD and CDF isomers. However, many are structurally similar to other CDD and CDF isomers that are potent toxicants. The Agency may permissibly infer that certain waste constituents are toxic, based upon structural similarity to known toxicants. See *EDF v. EPA*, 596 F. 2d 62, 76-63 (D.C. Cir. 1976) (prohibition of discharge to navigable waters of less chlorinated PCBs is permissible in the absence of specific toxicologic data due to their structural similarity to the more chlorinated PCBs).

Consequently, because most of the isomers of the listed CDDs and CDFs are toxic, albeit to different degrees, because identification of individual isomers in the waste would be an excessive regulatory burden, and because the Agency believes that these wastes would contain a certain percentage of the more toxic component, the Agency has determined that it is a conservative public health assumption that all the isomers of TCDD should be considered in estimating its toxicity. We have therefore determined that all the CDDs and CDFs identified or proposed to be identified in Appendix VIII should be considered as toxicants of concern in these wastes. This decision is analogous to the finding adopted by the Agency in the case of municipal waste resource recovery facilities.¹¹

2. *Toxicity of chlorophenols and their chlorophenoxy derivatives.* The other toxicants of concern in these wastes also have serious adverse effects. EPA's Carcinogen Assessment Group has

¹¹ See Interim evaluation of the health risks associated with emissions of tetrachlorinated dioxins from municipal waste resource recovery facilities. U.S. EPA, Office of the Administrator, November 14, 1981.

STDS: 1 ng/kg - JAP, EPA
25-50 ng/kg - FDA (CONC. IN FISH)
0.323 ng/kg CANADA

water, and their strong binding to organic soil constituents, CDDs and CDFs are not ordinarily expected to leach to ground water if proper precautions are taken. However, if these wastes are co-disposed with solubilizing solvents, or disposed in situations where soil binding site are exhausted, ground water contamination could result.

Although chlorophenols and chlorophenoxy compounds are subject to environmental degradation, including biodegradation by adapted communities, environmental pollution from these constituents has occurred where wastes from the production and manufacturing use of chlorophenols were mismanaged. More than twenty-five years after the improper disposal of chlorophenolic wastes at Love Canal, tri-, tetra-, and pentachlorophenols were identified in soil, water, and storm sewer sediments at concentrations ranging from 14 ppb (PCP in sump water) to 496 ppm (TCPs in storm sewer sediment).

A further risk to human health may be posed by improper incineration of these wastes. Improper incineration of chlorophenols are predicted to form CDDs and CDFs as products of incomplete combustion,¹³ posing a further risk of substantial harm. Indeed, as discussed later in this preamble, the Agency is studying whether different criteria or management standards (e.g., higher destruction and removal efficiency for the incineration of these wastes) are appropriate and practical.

D. Listing as acutely hazardous wastes.

It is clear from this discussion that these wastes have the potential to cause substantial harm, if mismanaged. The Agency is further convinced that these are acutely hazardous wastes under 40 CFR 261.11(a)(2), since they contain contaminants which, when tested in animals, are among the most toxic contaminants known, and thus are capable of causing, or significantly contributing to serious irreversible, or incapacitating reversible, illness.¹⁴ This standard is taken directly from Section 1004(5) of RCRA, and is reserved for wastes particularly likely to pose a substantial risk to human health and the

environment (see preamble to Part 261, 45 FR 33106, May 19, 1980).

Additional reasons for listing these wastes as acutely hazardous are that the wastes have been implicated in a series of damage incidents, among them the incidents of Love Canal and Times Beach. The Agency also has been compelled to exert regulatory control over many of these wastes under the Toxic Substances Control Act in the face of the unreasonable risk posed by ongoing and contemplated waste management practices (see further discussion in Part VI. below).

The practical consequences of such a listing are two-fold. First, these wastes will be subject to the 1 kg/month small quantity generator limitation contained in 40 CFR 261.5(e).¹⁵

The Agency deems 1 kg to be equivalent, for all practical purposes, to total control of the management of these wastes since they are generated in amounts far greater than 1 kg. The Agency solicits comments on the appropriateness of this limitation, however. Second, the residues in empty containers that contain these listed wastes are subject to control under Subtitle C of RCRA, unless the container has been triple-rinsed using a solvent capable of cleaning the container, or the container has been otherwise cleaned by a method that has been shown to achieve equivalent removal. In addition, as explained more fully below, we are proposing that these wastes be managed only at treatment, storage, and disposal facilities that have been fully permitted under RCRA (except as discussed in Section VII.). In the Agency's judgment, these wastes should be managed pursuant to the most stringent appropriate standards that are contained in the RCRA hazardous waste management regulations.

IV. Removal of Certain Commercial Chemical Products Listed in 40 CFR 261.33(f)

As discussed in the previous section, the Agency is proposing to list as acutely hazardous those unused discarded formulations containing tri-, tetra-, or pentachlorophenol and discarded formulations containing as

ingredients compounds derived from these chlorophenols. Some of these materials already are hazardous wastes under 40 CFR 261.33(f) when discarded or intended for discard in commercial grade, technical grade, or off-specification form, or when the toxicant is present in formulations as the sole active ingredient. They were originally listed as toxic (rather than acutely hazardous) because the Agency did not at that time consider the presence of CDDs and CDFs. However, as shown above, these formulations will contain chlorinated dioxins and -dibenzofurans, because the chlorophenol or chlorophenoxy derivatives will themselves be contaminated with CDDs and CDFs. For this reason, we are now listing them as acutely hazardous under 40 CFR 261.11(a)(2).

To avoid listing the same waste under two different (and inconsistent) provisions, we are proposing to remove EPA Hazardous Wastes U212, U230, U231, U232, U233, and U242 from 40 CFR 261.33(f). As a consequence, there should be no confusion that these wastes will be subject to a small-quantity generator exclusion of 1 kg/mo.

V. Regulatory Status of These Materials When Recycled by Being Used or Reused

On May 19, 1980, EPA promulgated a definition of solid waste which, among other things, states which materials are solid wastes when recycled. In promulgating this rule, EPA established broad jurisdiction over recycled materials and recycling operations. EPA is today proposing in a separate notice to revise this rule to state that certain types of activities involving secondary material use and reuse do not constitute solid waste management; in particular, the proposal states that secondary materials recycled by being used or reused as ingredients in new products, or by being used or reused directly as products, ordinarily are not solid wastes. The proposal provides that materials so used or reused may be listed individually in § 261.2(a)(3) as solid wastes if they meet two conditions: (1) They are ordinarily disposed of (on a nationwide basis), or contain toxic constituents which are not ordinarily found in raw materials or products used for the same purpose which constituents are not used during the recycling process; and (2) the materials could pose a substantial hazard to human health or the environment when so used or reused.

Both these conditions are met here. These wastes are typically disposed of or incinerated, rather than recycled.

¹³Shaub, W. M. and W. Tsang, Physical and chemical properties of dioxins in relation to their disposal. Proceedings 2nd. International Symposium on Dioxins, Arlington, VA, October 1981.

¹⁴By means of a site-specific exclusion petition, a generator may be able to show that a waste does not contain CDDs and/or CDFs at levels sufficient to sustain regulatory concern as acutely hazardous waste. Such levels, however, as well as the presence of chlorophenols or chlorophenoxy compounds, may still render such wastes hazardous.

¹⁵The Agency is proposing today to amend this provision to apply to all acutely hazardous wastes, not just to the acutely hazardous wastes listed in 40 CFR 261.33(c). At the time § 261.5 was written, there were no acutely hazardous wastes other than those in § 261.33(c). Now that we are proposing to list wastes in § 261.31 as acutely hazardous, we are proposing to conform the reference to acutely hazardous wastes in § 261.5. For the same reason, we are proposing to make the same type of conforming change to § 261.7(b)—the provision stating when containers that have held acutely hazardous wastes are "empty."

permitted under Section 3005(c) of RCRA. However, when this rule becomes effective, it will be illegal to dispose of these wastes at facilities that have not been fully permitted. Therefore, we believe the TSCA 60-day notification requirement is unnecessary; in addition, notification under Section 3010(b) will still be required and thus, the Agency will still be informed of who is handling these types of wastes.

We also believe that it will be less confusing for the regulated community, and more cost effective, both with respect to compliance and regulatory enforcement, for waste disposal to be regulated under RCRA alone, rather than under both statutes. Moreover, the technical expertise needed to issue permits for these wastes is chiefly within the Agency's office administering RCRA. We consequently believe that the public interest warrants rescission of the TSCA rule once this RCRA regulation becomes effective.

VII. Proposed Management of These Wastes

A. Management at RCRA Interim Status Facilities

As noted, the TSCA rule presently does not allow these wastes to be disposed or treated at interim status facilities without prior approval, because management of such waste at unscrutinized interim status facilities ordinarily presents an unreasonable risk (45 FR 32682). To avoid a decrease in regulatory coverage, and in light of the waste contaminants' high toxicity, persistence, and potential to bioaccumulate, we are proposing to amend the RCRA regulations, except as noted below, for landfills, waste piles, surface impoundments, land treatment facilities, and incinerators, to require that these wastes be managed only at fully permitted facilities. The reasons for the unreasonable risk finding still hold. Interim status incinerators need not perform at 99.99% destruction and removal efficiencies, or meet the other performance standards contained in Subpart O of Part 264. Interim status landfills, waste piles, surface impoundments, and land treatment facilities need not meet the monitoring requirements in Subpart F or many of the design and operating standards of Subparts K, L, M, and N of Part 264 until they are permitted. In addition, we believe that any facility that manages these wastes should be evaluated individually by EPA before accepting them in order to ensure that the facility is designed and operated properly. The proposed regulation consequently

prohibits interim status facilities from managing these wastes.

We have proposed three exceptions to this prohibition. The first applies to surface impoundments in which wastewater treatment sludges are generated. The Agency has the authority to prohibit interim status surface impoundments from receiving these wastes. If we propose this action, however, the facilities now generating the listed wastewater treatment sludges would probably have to close down until they obtain permits for their impoundments, or build alternative treatment facilities that can efficiently treat these wastes. The Agency is not proposing this course of action, and notes that Section 3004 of RCRA (as amended by the Solid Waste Disposal Act Amendments of 1980) specifically allows the Administrator, in setting standards for hazardous waste management facilities, to distinguish between new and existing facilities. The legislative history indicates that Congress was concerned with the costs of modifying existing wastewater treatment impoundments installed to meet Clean Water Act requirements (although the Agency has the authority to require such modification where appropriate). See S. Rep. No. 96-172, 96th Cong. 1st Sess., at 3. We are drawing this distinction in today's proposal.

Allowing these wastewater treatment sludges at interim status surface impoundments in which they are generated should be environmentally acceptable for the period until a permit is issued. These sludges are expected to contain lower concentrations of CDDs, CDFs, and chlorophenols than the other waste we are listing. The CDDs and CDFs present also will be adsorbed to the organic matter present; in addition, we believe that there should be little chance that solubilizing solvents, such as benzene, toluene, xylene, or halogenated benzenes, will be present in significant concentrations (since these solvents have very limited water solubility). This situation therefore should not present a significant risk of leaching. Risk of wind dispersal, one of the principal exposure pathways for CDD and CDF-containing wastes which are stored in open piles or disposed in landfills, is not present for these wastewater treatment sludges when they are in an impoundment.

We are not proposing to allow other interim status surface impoundments to manage these sludges, however, because other impoundments could contain CDD- or CDF-solubilizing residues from processes not related to chlorophenol or

chlorophenoxy manufacture. In addition, manufacturing operations will not be curtailed if these impoundments have to obtain permits before receiving these wastes.

For all of these reasons, therefore, we are proposing to allow the listed wastewater treatment sludges to be managed at the interim status surface impoundments in which they are generated. However, we expect, as a first priority, to evaluate the Part B permit applications of those interim status surface impoundments that manage these wastes. In order to minimize any potential risk. In addition, if monitoring data, or a review of site management make it apparent that the wastes cannot be prevented from migrating, the owner or operator of the facility will be required to remove the waste from the surface impoundment.

The second exception is for interim status tank and container facilities, which will be allowed to accept these wastes. These facilities, although not providing maximum protection, do provide control of these wastes to prevent them from posing a substantial environmental hazard or an unreasonable risk since tanks or containers at interim status facilities must meet most of the requirements (e.g., storage in non-leaking units, periodic inspections) required for fully permitted tank and container facilities. Therefore, these facilities should provide adequate management of these wastes in the short term. However, we do expect to give highest priority to examining the Part B permit applications of those interim status tank and container storage facilities that store these wastes, in order to minimize any potential risk.

The final exception is for enclosed waste piles. An "enclosed waste pile" is defined in this proposed rule as a pile that meets the requirements of § 264.250(c)—namely, that the pile is inside a structure that provides protection from run-on, precipitation, and wind dispersal; does not generate leachate, and does not contain free liquids. Under existing regulations, waste piles meeting these requirements are exempt from the otherwise-applicable permitting provisions of Subpart L of Part 264 relating to containment. (See 46 FR 55112, November 6, 1981.)

We are proposing that enclosed waste piles be allowed to accept these wastes without first obtaining a permit because enclosure of this type will guard in the short-term against the means of exposure of concern—run-off, wind dispersal, and leaching. In addition,

approval from the Regional Administrator. It was felt that the Agency could provide interim status facilities the same opportunities to handle these wastes as are provided to fully permitted facilities if the Agency can be assured that such management can be accomplished safely. The vehicle to be used to assure individualized consideration of prospective waste management would be a waste management plan that would address the factors outlined in the previous section as well as other design and operating conditions contained in the Part 264 regulations, as deemed appropriate by the Regional or State officials.

The procedures we considered for approving a waste management plan would be the same as, or similar to, those for approving a closure plan. They would allow for public participation on the plan submitted by the facility, and on a tentative decision (and a rationale therefor) of the Regional Administrator. The Regional Administrator could hold a public hearing if he believed it would aid in elucidating the issues.

However, the Agency believes that most interim status facilities probably could not adequately manage these wastes without significant changes. In addition, the amount and detail of information to be provided in the management plan could be almost equivalent to the information needed to obtain a permit. For example, as part of the waste management plan for incineration, the owner or operator of the incinerator would need to conduct a trial burn to ensure that destruction and removal efficiencies could be met. EPA thinks it is unlikely that interim status facilities would go to the expense of preparing and receiving approval on a plan, only to have to go through a later permit proceeding when their Part B application is processed.

However, the Agency solicits comments on the desirability of allowing disposal and treatment of these wastes at interim status facilities having an approved management plan for these wastes.

2. Additional Standards for Container and Tank Storage Facilities. The Agency believes that container storage facilities storing these wastes should meet the most stringent requirements under Part 264. Present regulations (Subpart I) do not require secondary containment for non-liquid wastes (e.g. tarry materials) if the storage area slopes, or the container is elevated. However, the Agency believes that secondary containment might appropriately be required for container storage areas that store all non-liquid

CDD and CDF-contaminated wastes, due to the toxicity of these wastes, their potential to ooze and to spill, and the long time periods these wastes may be stored before a disposal or incinerator treatment facility can be found that is willing to accept these wastes. (For example, the wastes at the Vertac site have been stored for many years, despite the repeated attempts by the company to find a disposal site.) This requirement may be necessary to ensure that any spillage or release of these wastes is contained and not released into the environment. The Vertac damage incident, where improper storage of these wastes was responsible for considerable harm, serves as an example of these wastes' potential for harm if stored improperly. The Agency therefore is considering a provision that would require secondary containment at container storage facilities that store non-liquid CDD- and CDF-contaminated wastes.

The Agency is also considering a provision that would require secondary containment at tank storage facilities that store CDD- and CDF-contaminated wastes, due to the wastes' toxicity and the long periods of time they might be stored. The damage incident at Neosho, Missouri, when a concrete tank holding chlorophenol production still bottoms (a waste covered by this proposal) and wastewater cracked, and caused considerable contamination, illustrates the potential for harm that secondary containment could address. The Agency solicits comment on the suitability of these two provisions.

3. Optional Standards Considered for Permitted Incinerators. Under current regulations, a facility which has shown that it can achieve 99.99% DRE for POHC's which are more resistant to thermal degradation than are CDDs or CDFs (such as carbon tetrachloride or pentachlorophenol), may be permitted to incinerate CDD or CDF-containing wastes without conducting an additional trial burn or modifying its permit (40 CFR 264.342 and 264.343). Because of their hazardousness, the Agency is considering proposing that a facility burning these wastes notify the Regional Administrator of that fact. We are considering this requirement because it is felt that Regional authorities might wish to prioritize compliance monitoring for facilities incinerating these wastes.

The Agency solicits comments on the desirability of requiring notification to the Regional Administrator on the part of a facility that is burning CDD or CDF wastes.

4. Development of Special Management Standards. The Agency is considering the development of special

management standards for CDD/CDF-contaminated wastes. For some wastes, high temperature incineration might be the preferred method of treatment, whereas for other wastes land disposal might be a better alternative. For the latter, disposal at sites having particular hydrogeological and topographic or surface water characteristics might be needed. The Agency is presently reviewing these problems, and may, for example, propose incineration standards that could require levels of destruction and removal efficiency (DRE's) for these wastes that are greater than the 99.99% DRE presently required under RCRA. For some wastes, land disposal controls ensuring the prevention of dust formation could be imposed, and for some wastes the Agency could prescribe the application of special technologies, such as photodechlorination, or molten salt or critical water oxidation, which are known to cause the destruction of chlorinated aromatics such as CDDs.

The Agency solicits comment with respect to the regulatory alternatives discussed above, as well as any other approaches which might realistically be considered.

VIII. Analytical Method for Tetra-, Penta-, and Hexachloro-Dibenzo-p-Dioxins and -Dibenzofurans

In order to assist generators in the determination of the contamination of wastes with the above compounds, (e.g. for delisting purposes under §§ 260.20 and 260.22 of the RCRA regulations), the Agency is proposing a method of analysis for tetra-, penta-, and hexachlorodibenzo-p-dioxins and -dibenzofurans (see Appendix A). The method proposed in this regulation was largely developed by the workers at Wright State University, and has been used for the analysis of TCDDs in a variety of wastes.¹⁹ If adopted, this method will replace the method for analysis of TCDD presently listed in the solid waste test manual ("Test Methods for Evaluating Solid Waste Physical/Chemical Methods", EPA publication number SW-846). The present method is inappropriate because it is not sufficiently sensitive, and does not sufficiently eliminate interfering substances. It also does not specify the procedure to be followed for the

¹⁹ "Analytical protocol for determination of TCDDs in phenolic chemical wastes and soil samples obtained from the proximity of chemical dumps", and "Analytical protocol for determination of chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans in river water", Brehm Laboratory, Wright State University, Dayton, OH 45435, January 7, 1982. These protocols are available in the Docket for this listing.

EPA Hazardous Waste Nos. F023. Although the FIFRA regulations (40 CFR 162) do require that active ingredients be identified by their chemical name or by a usual common name, and an EPA publication ("Accepted common names and chemical names for the ingredient statement on pesticide labels", EPA 540/9-7-017) is available to aid in their chemical identification, these aids may not convey sufficient information to the unsophisticated user. Non-pesticide products may also be hard to identify. Therefore, the Agency is considering various mechanisms to solve this potential problem (*i.e.*, labeling requirements for manufacturers, publishing a list of all products which contain these compounds, etc.). The Agency solicits comment on this potential problem.

5. Wastes which may contain CDDs and CDFs but which are not covered by the present regulation. The Agency has some data indicating that wastes, other than those covered by this proposal, may contain CDDs and CDFs. This may be the case, for instance for residuals such as fly ash from low temperature combustion of certain industrial wastes (especially of wastes containing chlorophenols, or chlorobenzenes); residuals from dichlorophenol manufacture; and sludges from wood preserving using pentachlorophenols. In the case of the first two wastes, although the Agency, on the grounds of knowledge of reaction chemistry and process technology, believes this may be the case, it lacks sufficient data to support this supposition. For this reason, studies are being conducted in order to gather more data. These wastes may be listed at a future date if further evidence demonstrates that they indeed are hazardous.

With regard to waste from wood preserving, we are presently investigating whether additional wastes from this process should be listed as hazardous, and whether CDDs and CDFs should be constituents of concern in the process wastes already listed (EPA Hazardous Waste K001, Wastewater treatment sludges). Pending completion of those studies we may take further regulatory action.

X. Economic, Environmental, and Regulatory Impacts

A. Regulatory Impact Analysis

Under Executive Order 12291, EPA must determine whether a regulation is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. The effect of the present amendment is judged not to be major, since it in part replaces regulation under

a different statute (Section 8(d) of the Toxic Substances Control Act), and imposes an additional regulatory burden only on three manufacturers of chlorophenols, and five manufacturers of chlorophenols and their chlorophenoxy derivatives. In addition, some number of manufacturers who use equipment that may be contaminated with CDDs or CDFs may also have additional regulatory burden. However, we presume that this part of the regulation is unlikely to affect many additional manufacturers other than the eight referred to above. In addition, this regulation imposes a regulatory burden on persons or entities discarding some unused formulations containing tri-, tetra-, or pentachlorophenol or unused formulations containing compounds derived from these phenols. The disposal of many of these formulations, however, is already regulated under § 261.33 of RCRA. Additionally, because of their inherent value, we do not believe that the regulated community will usually discard substantial quantities of these materials, further minimizing any impact.

In addition, we believe that there will be no adverse impact on the ability of U.S.-based enterprises to compete with foreign-based enterprises in domestic or export markets. Therefore, since the Agency does not expect that the proposed action will result in either an effect on the economy of \$100 million or more, or an adverse impact on U.S.-based enterprises, this proposed regulation is not considered to be a major action. Because this proposed amendment is not a major regulation, no Regulatory Impact Analysis has been conducted.

This amendment was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMB to EPA, and any EPA responses to those comments are available for public inspection in Room S-269C at EPA.

B. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act, 5 U.S.C. § 601 *et seq.*, whenever an agency is required to publish a general notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the impact of the rule on small entities (*i.e.*, small businesses, small organizations, and small governmental jurisdictions). No regulatory flexibility analysis is required, however, if the head of the agency certifies that the rule will not have a significant economic

impact on a substantial number of small entities.

Only one of the hazardous wastes proposed to be listed in § 261.31 is expected to be generated by small entities. The Agency anticipates that pesticide aerial applicators will constitute the main segment of small business entities affected by this regulation.²⁰ However, these persons are probably already regulated under RCRA since a large number of pesticides (both acutely hazardous and toxic) are currently covered by existing regulations. Therefore, we would not expect any aerial applicators to be newly regulated as a result of this rule. In addition, the Agency does not believe that small entities will dispose of significant quantities of the commercial chemical products proposed for regulation. Thus, today's amendment is unlikely to have a significant economic impact on a substantial number of small entities. This regulation therefore does not require a regulatory flexibility analysis.

C. Paper Reduction Act of 1980

The reporting or recordkeeping (information) provisions in this rule will be submitted for approval to the Office of Management and Budget (OMB) under Section 3504(h) of the Paperwork Reduction Act of 1980, U.S.C. 3501 *et seq.* Any final rule will explain how its reporting or recordkeeping provisions respond to any OMB or public comments.

XII. Rulemaking Record

The public docket for 40 CFR Part 775 is located in Room E-107 at the address listed for the U.S. Environmental Protection Agency in the address section of this preamble. The entire rulemaking docket for the rule being proposed today is included in the record for 40 CFR Part 775. EPA will identify the complete rulemaking record for 40 CFR part 775 on or before the date of repeal. EPA will consider any time between the publication of this notice and the date the Agency identifies the final record.

XII List of Subjects

40 CFR Part 261

Hazardous materials, Waste treatment and disposal, Recycling.

²⁰ Farmers may also generate some of these wastes—discarded unused formulations—however, farmers are exempt from regulation provided the waste pesticides are from their own use and are disposed of on their own farm in a manner consistent with the disposal instructions on the pesticide label. Therefore, we do not expect farmers to be severely impacted.

Appendix III—Chemical Analysis Test Methods

TABLE 1.—ANALYTICAL CHARACTERISTICS OF ORGANIC CHEMICALS

Compound	Sample handling class/fraction	Non-GC methods	Measurement techniques	
			GC/MS	Conventional GC Detector
Chlorinated dibenzo-p-dioxins	Extractable/BN		8280	
Chlorinated dibenzofurans	Extractable/BN		8280	

7. Add the following entries in numerical order to Appendix VII of Part 261:

Appendix VII—Basis for Listing Hazardous Wastes

EPA hazardous waste No.	Hazardous constituents for which listed	EPA hazardous waste No.	Hazardous constituents for which listed
F020	tetra-, penta-, and hexachlorodibenzo-p-dioxins; tetra-, penta-, and hexachlorodibenzofurans; and tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, and amine salts.	F022	tetra-, penta-, and hexachlorodibenzo-p-dioxins; tetra-, penta-, and hexachlorodibenzofurans; and tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, and amine salts.
F021	tetra-, penta-, and hexachlorodibenzo-p-dioxins; tetra-, penta-, and hexachlorodibenzofurans; and tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, and amine salts.	F023	tetra-, penta-, and hexachlorodibenzo-p-dioxins; tetra-, penta-, and hexachlorodibenzofurans; and tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, and amine salts.

8. Add the following constituents in alphabetical order to Appendix VIII of Part 261:

Appendix VIII—Hazardous Constituents

hexachlorodibenzo-p-dioxins
hexachlorodibenzofurans
pentachlorodibenzo-p-dioxins
pentachlorodibenzofurans
tetrachlorodibenzo-p-dioxins
tetrachlorodibenzofurans

9. Appendix IX is added to Part 261 to read as follows:

Appendix IX—Method of Analysis for Chlorinated dibenzo-p-dioxins and -dibenzofurans^{1,2,3}

Method 8280

1. Scope and Application.

¹This method is appropriate for the analysis of tetra-, penta-, and hexachlorinated dibenzo-p-dioxins and -dibenzofurans.

²Analytical protocol for determination of TCDDs in phenolic chemical wastes and soil samples obtained from the proximity of chemical dumps. T.O. Tierman and M. Taylor. Brehm Laboratory, Wright State University, Dayton, OH 45435.

³Analytical protocol for determination of chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans in river water. T.O. Tierman and M. Taylor. Brehm Laboratory, Wright State University, Dayton, OH 45435.

In general, the techniques that should be used to handle these materials are those which are followed for radioactive or infectious laboratory materials. Assistance in evaluating laboratory practices may be obtained from industrial hygienists and persons specializing in safe laboratory practice. Typical

1.1 This method covers the determination of chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans in chemical wastes including still bottoms, filter aids, sludges, spent carbon, and reactor residues, and in soils.

1.2 The sensitivity of this method is dependent upon the level of interferences.

1.3 This method is recommended for use only by analysts experienced with residue analysis and skilled in mass spectral analytical techniques.

1.4 Because of the extreme toxicity of these compounds, the analyst must take necessary precautions to prevent exposure to himself, or to others, of materials known or believed to contain CDDs or CDFs.

Infectious waste incinerators are probably not satisfactory devices for disposal of materials highly contaminated with CDDs or CDFs. A laboratory planning to use these compounds should prepare a disposal plan to be reviewed and approved by EPA's Dioxin Task Force (Contact Conrad Klevens, WH-548A, U.S. EPA, 401 M Street, S.W., Washington, D.C. 20460).

2. Summary of the Method.

2.1 This method is an analytical extraction cleanup procedure, and capillary column gas chromatography-low resolution mass spectrometry method, using capillary column GC/MS conditions and internal standard techniques, which allow for the measurement of PCDDs and PCDFs in the extract.

2.2 If interferences are encountered, the method provides selected general purpose cleanup procedures to aid the analyst in their elimination.

3. Interferences.

3.1 Solvents, reagents, glassware, and other sample processing hardware may yield discrete artifacts and/or elevated baselines causing misinterpretation of gas chromatograms. All of these materials must be demonstrated to be free from interferences under the conditions of the analysis by running method blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be required.

3.2 Interferences co-extracted from the samples will vary considerably from source to source, depending upon the diversity of the industry being sampled. PCDD is often associated with other interfering chlorinated compounds such as PCB's which may be at concentrations several orders of magnitude higher than that of PCDD. While general cleanup techniques are provided as part of this method, unique samples may require additional cleanup approaches to achieve the sensitivity stated in Table 1.

3.3 The other isomers of tetrachlorodibenzo-p-dioxin may interfere with the measurement of 2,3,7,8-TCDD. Capillary column gas chromatography is required to resolve those isomers that yield virtually identical mass fragmentation patterns.

4. Apparatus and Materials.

4.1 Sampling equipment for discrete or composite sampling.

4.1.1 Grab sample bottle—amber glass, 1-liter or 1-quart volume. French or Boston Round design is recommended. The container must be washed and solvent rinsed before use to minimize interferences.

4.1.2 Bottle caps—threaded to screw on to the sample bottles. Caps must be lined with Teflon. Solvent washed foil, used with the shiny side towards the sample, may be substituted for the Teflon if sample is not corrosive.

4.1.3 Compositing equipment—automatic or manual compositing system. No tygon or rubber tubing may be used, and the system must incorporate glass sample containers for the collection of a minimum of 250 ml. Sample containers must be kept refrigerated after sampling.

4.2 Water bath—heated, with concentric ring cover, capable of temperature control ($\pm 2^\circ\text{C}$). The bath should be used in a hood.

4.3 Gas chromatograph/mass spectrometer data system

4.3.1 Gas chromatograph: An analytical system with a temperature-programmable gas chromatograph and all required accessories including syringes, analytical columns, and gases.

9.8 Elute the microcolumn with 10 ml of 3% methylene chloride-in-hexane followed by 15 ml of 20% methylene chloride-in-hexane and discard these effluents. Elute the column with 15 ml of 50% methylene chloride-in-hexane and concentrate this effluent (55° C water bath, stream of prepurified nitrogen) to about 0.3-0.5 ml.

9.9 Quantitatively transfer the residue (using methylene chloride to rinse the container) to a silanized Reacti-Vial (Pierce Chemical Co.). Evaporate, using a stream of prepurified nitrogen, almost to dryness. Rinse the walls of the vessel with approximately 0.5 ml methylene chloride, evaporate just to dryness, and tightly cap the vial. Store the vial at 5°C until analysis, at which time the sample is reconstituted by the addition of tridecane.

9.10 Approximately 1 hour before GC-MS (HRGC-IRMS) analysis, dilute the residue in the micro-reaction vessel with an appropriate quantity of tridecane. Gently swirl the tridecane on the lower portion of the vessel to ensure dissolution of the CDDs and CDFs. Analyze a sample by GC/EC to provide insight into the complexity of the problem, and to determine the manner in which the mass spectrometer should be used. Inject an appropriate aliquot of the sample into the GC-MS instrument, using a syringe.

9.11 If, upon preliminary GC-MS analysis, the sample appears to contain interfering substances which obscure the analyses for CDDs and CDFs, high performance liquid chromatographic (HPLC) cleanup of the extract is accomplished, prior to further GC-MS analysis.

10. HPLC Cleanup Procedure.

10.1 Place approximately 2 ml of hexane in a 50 ml flint glass sample bottle fitted with a Teflon-lined cap.

10.2 At the appropriate retention time, position sample bottle to collect the required fraction.

10.3 Add 2 ml of 5% (w/v) sodium carbonate to the sample fraction collected and shake for one minute.

10.4 Quantitatively remove the hexane layer (top layer) and transfer to a micro-reaction vessel.

10.5 Concentrate the fraction to dryness and retain for further analysis.

11. GC/MS Analysis

11.1 The following column conditions are recommended: Glass capillary column conditions: SP-2250 coated on a 30 m long x 0.25 mm I.D. glass column (Supelco No. 2-3714, or equivalent) with helium carrier gas at 30 cm/sec linear velocity, run splitless. Column temperature is 210°C. Under these conditions the retention time for TCDDs is about 9.5 minutes. Calibrate the system daily with, a minimum, three injections of standard mixtures.

11.2 Calculate response factors for standards relative to ¹²Cl-TCDD/F (see Section 12).

11.3 Analyze samples with selected ion monitoring of at least two ions from Table 3. Proof of the presence of CDD or CDF exists if the following conditions are met:

11.3.1 The retention time of the peak in the sample must match that in the standard, within the performance specifications of the analytical system.

11.3.2 The ratio of ions must agree within 10% with that of the standard.

11.3.3 The retention time of the peak maximum for the ions of interest must exactly match that of the peak.

11.4 Quantitate the CDD and CDF peaks from the response relative to the ¹²Cl-TCDD/F internal standards. Recovery of the internal standard should be greater than 50 percent.

11.5 If a response is obtained for the appropriate set of ions, but is outside the expected ratio, a co-eluting impurity may be suspected. In this case, another set of ions characteristic of the CDD/CDF molecules should be analyzed. For TCDD a good choice of ions is m/e 257 and m/e 259. For TCDF a good choice of ions is m/e 241 and 243. These ions are useful in characterizing the molecular structure of TCDD or TCDF. For analysis of TCDD good analytical technique would require using all four ions, m/e 257, 320, 322, 328, to verify detection and signal to noise ratio of 5 to 1. Suspected impurities such as DDE, DDD, or PCB residues can be confirmed by checking for their major fragments. These materials can be removed by the cleanup columns. Failure to meet criteria should be explained in the report or the sample reanalyzed.

11.6 If broad background interference restricts the sensitivity of the GC/MS analysis, the analyst should employ cleanup procedures and reanalyze by GC/MS.

11.7. In those circumstances where these procedures do not yield a definitive conclusion, the use of high resolution mass spectrometry is suggested.

12. Calculations

12.1 Determine the concentration of individual compounds according to the formula:

$$\text{Concentration, } \mu\text{g/gm} = \frac{A \times A_s}{G \times A_u \times R_f}$$

Where:

A = μg of internal standard added to the sample.^a

G = gm of sample extracted

A_s = area of characteristic ion of the compound being quantified

A_u = area of characteristic ion of the internal standard

R_f = response factor

Response factors are calculated using data obtained from the analysis of standards according to the formula:

$$Rf = \frac{A_s \times C_u}{A_u \times C_s}$$

^aThe proper amount of standard to be used is determined from the calibration curve (See Section 8.0).

Where:

C_s = concentration of the standard

C_u = concentration of the sample

12.2 Report results in micrograms per gram without correction for recovery. When duplicate and spiked samples are analyzed, all data obtained should be reported.

12.3 Accuracy and Precision. No data are available at this time.

TABLE 1—Gas Chromatography of TCDD.

Column	Retention time (min.)	Detection limit (ug/l)
Gas Capillary	9.5	0.003

¹Detection limit for liquid samples is 0.003 ug/l. This is calculated from the minimum detectable GC response being equal to five times the GC background noise assuming a 1 ml effective final volume of the 1 liter sample extract, and a GC injection of 0.1 microliters. Detection levels apply to both electron capture and GC/MS detection. For further details see 44 FR 60529 (December 2, 1979).

TABLE 2.—DFTPP KEY IONS AND ION ABUNDANCE CRITERIA¹

Mass	Ion abundance criteria
61	30 to 60 percent of mass 188.
66	Less than 2 percent of mass 60.
70	Do.
127	40 to 60 percent of mass 188.
187	Less than 1 percent of mass 188.
188	Base peak, 100 percent relative abundance.
190	5 to 8 percent of mass 188.
275	10 to 30 percent of mass 188.
305	Greater than 1 percent of mass 188.
441	Present but less than mass 443.
442	Greater than 40 percent of mass 188.
443	17 to 23 percent of mass 442.

¹J. W. Eichelberger, L. E. Harris, and W. L. Budde, 1975. Reference compound to calibrate ion abundance measurement in gas chromatography-mass spectrometry. *Analytical Chemistry* 47:565.

TABLE 3.—LIST OF ACCURATE MASSES MONITORED USING GC SELECTED-ION MONITORING, LOW RESOLUTION, MASS SPECTROMETRY FOR SIMULTANEOUS DETERMINATION OF TETRA-, PENTA-, AND HEXACHLORINATED DIBENZO-*p*-DIOXINS AND DIBENZOFURANS

Class of chlorinated dibenzodioxin or dibenzofuran	Number of chlorine substituents (n)	Monitored m/z for dibenzodioxins C ₁₂ H ₆ Cl _n O ₂	Monitored m/z for dibenzofurans C ₁₂ H ₄ Cl _n O	Approximate theoretical ratio expected on basis of isotopic abundance
Tetra	4	¹⁸¹ 0.697 ³²¹ 0.894 ³²⁷ 0.893 ²⁵⁶ 0.933 ²⁵⁸ 0.900	¹⁸³ 0.902 ³²³ 0.959	0.74 1.00
Penta	5	¹⁸³ 0.958 ³⁵⁵ 0.955	¹⁸⁷ 0.963 ³⁵⁹ 0.960	.21 1.00
Hexa	6	³⁶⁹ 0.918 ³⁸¹ 0.913	³⁷³ 0.921 ³⁷⁵ 0.918	1.00 .87

¹Molecular ion peak.

²¹²Cl-labelled standard peaks.

³Ions which can be monitored in TCDD analyses for confirmation purposes.

(ii) The waste is stored in tanks or containers.

(iii) The waste is stored or treated in waste piles that meet the requirements of § 264.250(c) as well as all other applicable requirements of Subpart L of this Part.

PART 775 [REMOVED]

17. The authority citation for Part 775 reads as follows:

Authority: Sec. 6 of the Toxic Substances Control Act (TSCA) Pub. L. 94-469, 90 Stat. 2020 [15 U.S.C. 2605].

18. Title 40 is amended by removing Part 775.

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